

The Amateur Radio

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Volume 1 Number 4



- History of Radio Regulation: Part 2
- All About Frequency ● Amateur Radio Classes at Hotels
- Electronic Adventures of Dan and Burke

Cellular Fone Fighter

Personal communications without the monthly bill.

By Don Stoner, W6TNS

I couldn't believe it! In order to buy a cellular phone, I had to sign up for a year of service—good or bad. I also had to pay a minimum charge each month, even if I didn't make a single call. And, if I did use it—their electronic cash register gobbled up 40 cents a minute!!

THEN SANITY PREVAILED

My ever practical wife doused me with a bucketful of reality. "Why do you need a cellular phone? You've got a ham license," she reasoned. "At those prices you could pay for a handheld two-way radio in a few months."

She was right—as usual. I wanted the phone to keep in touch with the family and friends. A phone in the car would save a lot of grief in an emergency. My bride reminded me that ham radio could provide all this and a lot more, so long as I didn't use it for business (that's not permitted in the Amateur Radio Service). Most important, the price was right—it was free!

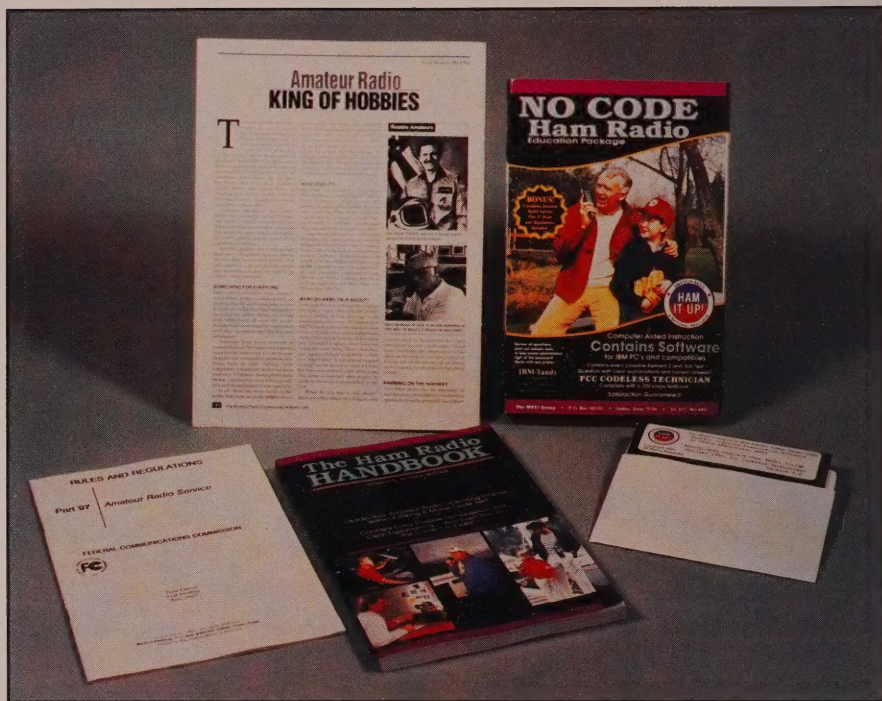
Don't confuse ham radio with CB—there's a world of difference! Amateurs use FM two-way radios for static-free, one conversation at a time, communication. When transmitting via mountain-top repeaters, hams communicate over ranges of a hundred miles or more using tiny radios that fit in a purse or pocket.

WANT TO MAKE NEW FRIENDS?

If so, ham radio is for you. Anyone can be a ham radio operator. There's no age restriction or nationality requirement. Other Amateurs don't care who you are or what you look like—you are just one of the many people that "hang out" on the ham bands. Amateur Radio is a great diversion for young people who need a new direction in their life.

Are you a boater? No matter where your vessel is located, you can contact an Amateur by radio. With a ham "rig" connected to your backstay, you are never out of radio contact with someone, somewhere in the world.

Ham radio is the most ideal hobby ever "invented" for retired persons. There is always someone to talk with at any hour of the day or night. With an FM two-way radio, you can have static-free contact with other hams virtually anywhere you travel in the U.S.



TOO GOOD TO BE TRUE?

Sure, there's a catch. To operate a ham station, you need a license issued by the Federal Communications Commission. However, the FCC has eliminated the Morse code requirement for newcomers. You don't need to know a dot from a dash! To earn a license, all you have to do is pass a multiple choice written test. It's almost as easy as getting a drivers license—and there's no "driving test."

I've made getting a ham license even easier with a new book called *The Ham Radio Handbook*. The book includes every question you might be asked on the written test and all the possible answers for each multiple choice question. My book also tells you which answer is correct along with some simplified theory to explain why the answer is correct.

THE DON STONER GUARANTEE

If you can earn a ham license at all, you can do it after reading my book. I'm so sure, I'll make this guarantee: If you fail your license exam after reading *The Ham Radio Handbook*, just return everything in salable condition and I'll refund the full purchase price—including postage (proof of purchase required). You can pass the ham test and I guarantee it!!

Take advantage of my bonus education package. I'll send the book, plus IBM

compatible software for testing your knowledge. It will tell you when you are ready to take your test. The program displays randomly selected questions, lets you pick the correct answer and grades your performance. Or, if you prefer, you can print out the tests. The package includes a complete list of Contact Volunteer Examiners. They can tell you where and when to take your test no matter where you live. The package contains a bonus booklet which provides all the FCC Rules and Regulations on ham radio. Another bonus is the certificate for a free copy of *The Amateur Radio Communicator*, the journal of the National Amateur Radio Association.

All this is yours if you place a free call to the National Amateur Radio Association at 1-800-468-2426. Have your VISA or MasterCard ready. Tell the operator you want the NARA Amateur Radio Educational package for \$29.95 (\$3.00 S&H) to any U.S. address. Or, if you just want the book, your cost is only \$9.95 (\$2.00 S&H) if you mention seeing this advertisement. If you prefer to send a check, write the National Amateur Radio Association, 16541 Redmond Way, Suite 232, Redmond, WA 98052.

Ham radio is guaranteed to influence your life and future positively.
DO IT TODAY!!

CONTENTS

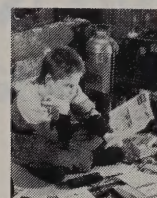
FEATURES

- 5 Touch of Class**
All About Frequency
by Terry Dettmann, WX7S
- 10 The Adventures of Dan and Burke**
- 13 Ham Radio and Science Class**
by Richard J. Reed, N9AKZ

DEPARTMENTS

- 2 In My Opinion**
- 4 Letters**
- 7 Ham Radio Outlook**
History of Radio Regulation
- 14 Teaching the Ham Class**
Amateur Radio Classes in Hotels

ON THE COVER



This month's cover photo first appeared on the 1991 Dayton Hamvention program booklet. Although the young man (11-year-old Jason Pelaez, N8NDQ) is looking at past issues of the Hamvention program, it could have been old

(Continued on page 16)

The Amateur Radio Communicator

The Amateur Radio Communicator is published monthly and is the official journal of the National Amateur Radio Association (NARA), 16541 Redmond Way, Suite 232, Redmond, WA 98052.

The National Amateur Radio Association is incorporated in the State of Washington and is an exempt organization as defined in Section 501(c)(3) of the Internal Revenue Service Code.

Organization Goals

The National Amateur Radio Association is a nonprofit organization. It consists of individuals interested in the art of radio communication. The broad goal of NARA is to make Amateur Radio more widely known and to encourage more people to become involved in the Amateur Radio Service.

The organization has four specific goals within this broad framework. These are to a) publicize Amateur Radio to the general public, b) attract young people to the Amateur Radio Service, c) help existing Amateurs achieve the greatest benefit from the Amateur Radio Service and d) make Amateurs aware that our radio frequencies are in jeopardy from commercial interests.

NARA advertises in various consumer publications to create a public awareness of the Amateur Radio Service and to encourage readers to write NARA for more information. The Association also solicits authors who write on the subject of Amateur Radio in these publications. NARA has committed itself to making Amateur Radio more interesting and more accessible to all concerned.

NARA is specifically interested in encouraging young people to join our frater-

nity. The organization works with educators to increase awareness of the Amateur Radio Service and its value as an interesting way of educating young people. A core of young people insures continued growth of the Amateur Radio Service.

NARA believes that existing Amateurs should be more aware of the radio communication theory. Each month an article will appear in *The Amateur Radio Communicator* which discusses a technical aspect of the Amateur Radio Service.

NARA is very concerned that confiscation of frequencies assigned to the Amateur Radio Service will continue. These frequencies are a precious resource. On the other hand, there are an inadequate number of frequencies to accommodate all the new communication requirements. Amateurs must create an environment where it is more beneficial to the public to have Amateur Radio operators on these frequencies than new and emerging commercial services.

Membership and Subscriptions

Those joining NARA receive a subscription to *The Amateur Radio Communicator* for a period of one year. The combined cost of membership and magazine is \$10.00 per year in all areas with a U.S. ZIP code. The cost is \$16.00 per year in Canada and \$20.00 per year elsewhere.

The NARA membership and subscription to *The Amateur Radio Communicator* cannot be separated. Since NARA is a nonprofit corporation, the membership cost may be tax deductible. Verify this with your accountant.

It is not necessary to hold an Amateur Radio license to become a member of the National Amateur Radio Association. The

only "qualification" is an interest in radio communications.

Editorial Policy

Each article and column which appears in *The Amateur Radio Communicator* is evaluated by the Editorial Board to meet a single criteria: how it contributes to NARA's educational objectives. Editorial material is intended to either (1) interest new people in becoming a Radio Amateur, (2) help existing Radio Amateurs get more out of their hobby through better understanding, (3) explain the theory behind some aspect of the service or (4) educate Amateurs on how to retain our valuable spectrum.

How To Contact NARA

The editors of *The Amateur Radio Communicator* and officers of the National Amateur Radio Association want to hear from you. Please send your questions, comments or submissions to the National Amateur Radio Association, 16541 Redmond Way, Suite 232, Redmond, WA 98052 or call 1-800-GOT-2-HAM (1-800-468-2426) or 206-232-2579. Our MCI Mailbox is NARANET3 and on CompuServe it is 76702,753.

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We Must Stop Cheating Our Children

PART 2

BY DON STONER, W6TNS

There is no doubt in my mind that all people are created equal. Those who claim that various races are deficient or superior in this or that area are simply misinformed. Unfortunately, by the time our children reach school age, they are no longer equal. They have long since become the sum of their environment; many times, the world that envelops them destroys their initiative in varying degrees. It is possible that people who live in small towns and rural areas cannot conceive of neighborhoods where children are taught to "drop" when they hear the popping sound of gunfire. Socioeconomic conditions, shattered and single parent homes, or abusive and uncaring parents are not particular to any race, creed, or color. The common denominator of these climates is the destructive effect they have on children.

WHY WERE YOU BORN?

The basic purpose of having children is to propagate the human race. We seem to have forgotten that the purpose of an educational system is to help insure that the future populace is competent to contribute to the human race.

Unfortunately, our educational system has failed miserably in its mission. Recently, the National Assessment of Education Progress (NAEP) reported that 50 percent of our eighth graders resolve math problems at just above fifth-grade level. They further state that only 14 percent of eighth

graders managed to score at the seventh-grade level or higher.

Who is to blame for the morass? There is more than enough blame to go around for everyone. We are all guilty of shortchanging the current generation. It's the collective fault of parents, educators, industry, and politicians.

When children enter school they are, for the most part, "bright-eyed and bushy-tailed." They still have ex-

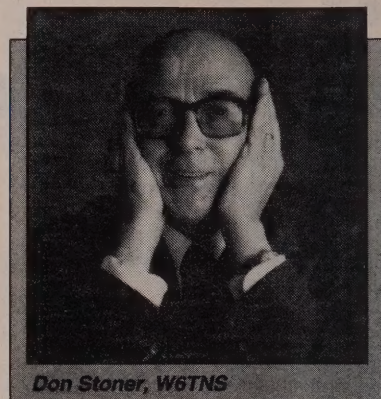
"... our children are not challenged to reach their full potential."

pectations and few preconceived notions. However, as they progress through the education system, many become disenchanted with the experience.

The schools bear a great deal of blame for this. Schools have become institutions that warehouse the youngsters while the parents earn a living to pay the taxes to maintain the institutions. With some notable exceptions, our children are not challenged to reach their full potential. Many teachers would like to insist on higher standards for their classes but they cannot. Why? Because neither the parents nor the school administration would support them.

ARE YOUR KIDS TREATED LIKE CORDWOOD?

Why do the overwhelming majority of students *always* pass their classes



Don Stoner, W6TNS

and advance to the next grade? The occasional student may flunk, but most pass after having completed the curriculum requirements. To prevent failed students from stacking like cordwood, the curriculum requirements are geared to the *lowest common denominator*. Those who rank in the lower regions in the bell curve of performance must pass to avoid a logjam, while those who rank near the upper limits are unchallenged and totally bored. Consider, if you will, the cumulative effects of this occurrence year after year.

Obviously the taxes that you pay help operate the schools? But wait—funding is more than reaching into your pockets to provide the necessary dollars. Many schools are allocated money based on the total number of students enrolled. It does not matter if the student is interested in getting an education or not. The more students—the more bucks!

TENURE—A FAMILIAR CONCEPT

How would you like to work in a company where some of your fellow workers could not be fired? Of course there are exceptions. If an employee was sexually molesting the boss's daughter or son, and the union could be convinced that this constituted a problem, the employee could be "canned." What if your fellow worker was simply unmotivated, bored, or incompetent, but couldn't be fired? Would you strive for excellence when you could be fired due to lack of work, but your bumbling associate could not? Some of you might think this is perfectly fine as long as you enjoyed the same protection. But what if you did not?

This is the situation in schools today. After meeting a set of conditions, or surviving in the system for a period of time, teachers enjoy a Valhalla called tenure. Having reached this state of pure bliss, some rest on their laurels and mark time until the day they can retire with a pension. Don't misunderstand. Most teachers do not "slack off," whether they have tenure or not. As a group, teachers are dedicated individuals who often struggle with overcrowded classes, insolent students, a politicized administration and uncaring parents. Considering their responsibility, they are generally underpaid, usually overworked, and often find it necessary to use their own funds to purchase classroom supplies.

COMES THE REVOLUTION!

Fortunately, I am not simply a "voice in the wind." Others around the country feel as I do, and education is starting to undergo a renaissance. There is a nationwide clamor for accountability. The movement is being forced on the academic community by virtue of limited taxpayer funds. We are starting to hear our legislators use phrases like "more bang for the buck" and "pay for performance."

I believe there are many things that can and must be done to stop the ongoing degeneration of our educational system. Money is not the total solution nor is federal assistance. Mr. Bush gets a F-minus as our "education president." If education was one of the President's "thousand points of light," it was battery operated and the rabbit died.

The educational system must be revamped from top to bottom. Anything less is a bandage on a cancer. The first, and most important change, is to operate schools like a *business* instead of a fiefdom. Schools should take the raw material of youth, add knowledge and wisdom, and create a product that is an asset to the community and society. Schools must turn out the type of product that the community needs and desires. As in business, schools should be compensated for the product they produce based on its value. How do you establish value

with something as intangible as knowledge? You establish a standardized processing method, then *test* to see if the product meets the standard.

When student testing has been proposed in the past, the question of the fairness of testing procedure is justifiably raised. There is enormous pressure to produce high scores. Quite often the teachers who administer the testing cheat like riverboat gamblers to make their class and school look better than others.

A former assistant education secretary, Chester Finn, Jr. is concerned that school officials "select tests to make the school systems look good." He feels it's an unregulated industry. "The American public needs a credible outside audit," says Finn. Standardized testing of students is a valid means of establishing how well they meet established standards. As Mr. Finn points out, however, teachers

"The educational system must be revamped from top to bottom."

must not do the testing. This is like having the production manager do the quality-control testing in a factory. With this scheme, the product is always pronounced superior. The "credible outside audit" should be done by volunteers from the community, such as parents and members of industry who must ultimately accept the product produced by the schools. If this sounds familiar, it should. We use this concept regularly and successfully in testing the public to become hams, or to upgrade existing Amateur Radio operators.

Similarly, the employees of the "education factory" also must be tested regularly. The howling you hear is not someone dancing with wolves. It is the sound of the various teacher unions baying in unison that it is unfair, won't work, discriminates, etc. ad nauseam. Sorry folks, but it works in millions of

progressive businesses all over the country, day after day. Employees are evaluated and paid on the basis of their performance and ability to meet preestablished criteria. Those who excel are rewarded, and those who consistently fail to meet the criteria are abandoned.

Across the nation, slowly but inexorably, test scores are becoming the basis for school funding, including salaries and bonuses. Pay for performance is a concept for the 90's and beyond. In Washington State, teachers have been clamoring for better wages and smaller classes. The legislature has agreed as long as the increases are tied to performance. The idea will spread to other states as the populace is increasingly bled dry of tax revenues.

The administration may be learning from the example set by the states. This spring, President Bush proposed the creation of national achievement tests in math, English, science, history and geography for all fourth, eighth, and twelfth graders. If the tests become reality, they will be similar to the NAEP tests: designed to measure whether or not students have mastered specific skills at their grade level. The standardized tests must not allow a masking of the fact that a school is performing its educational mission poorly.

There is a significant, positive benefit gained from the national testing of students. Invariably, teachers will "teach to the test." There is nothing wrong with this. Gordon West teaches the test material that one is required to know to earn a license in the Amateur Service. When he graduates a class, you know his students have received a specific education suitable to the license level for which they studied.

There is another significant benefit to achievement testing. "Teaching to the test" at a national level will result in a de facto standard for a child's education. This is an improvement that is sorely needed in this country. Why should the students in Ft. Lauderdale receive a better education than those in Rapid City, South Dakota? Simply because the Floridians have a

(Continued on page 4)

CHEATING OUR CHILDREN

(Continued from page 3)

better tax base? Talk about discrimination! Do you really think a native American, living on a reservation, gets the same education as someone in Beverly Hills, California? They do not! It's wrong and the situation must be redressed if this nation is to regain its education stature in the community of nations. In my opinion, if anyone in this nation wants a good education and is willing to work for it, they are absolutely entitled to the opportunity. Anyone! A nation that does not provide this opportunity to everyone is cheating all its citizens, not just the youth.

WHAT HAPPENED TO QUALITY?

Do you resent the fact that increasing numbers of Americans buy Toyotas and "beemers?" If so, why don't you suggest that your school system teach students the meaning and importance of quality, pride in workmanship, and the relationship between employer and employee? If enough people did this, Detroit might learn how to make a reliable automobile instead of the trash they foist off on a patriotic and gullible public.

In case you are wondering what this has to do with ham radio, let me explain. If you want young people to join our hobby and become an asset to the fraternity, the recruitment must start in the schools. We want Amateurs who know how to calculate the length of the dipole they are putting up, or who do not punctuate their on-the-air sentences with "ya know."

Amateur Radio is a natural "foot-in-the-door" subject to aid in the teaching of math, science, geography, and a host of other subjects that are sorely lacking in the functional illiterates we produce today.

There is much more that can and must be done to treat our educational system but I've gored my limit of oxen for this issue. Next month, we'll look at the wave of the future: increasing standards with a dual track education system!

73, Don, W6TNS



NEWS FROM THE SVARC

The Shenandoah Valley Amateur Radio Club will conduct its 41st Hamfest Sunday, August 4th at the Clarke County Fairgrounds in Berryville, VA. I'd appreciate 300 copies of *The Amateur Radio Communicator* for distribution. A copy of the schedule for upcoming short-courses preparing students for ham licensing is also attached.

73's,
Guy Black, W4PSJ
1201 Woodside Drive
Winchester, VA 22601

□ Sorry this notice won't get to the readers in time, Guy, but they'll be ready for your 42nd Hamfest! Drop a line to Guy if you live in the area and are interesting in training courses—Ed.

THANKS FOR NARA

Hello, this is KC6BAL. I saw your ad in *Nuts and Volts* magazine and decided it was time for a change from the "ivy-covered walls" of the ARRL. I would like to learn more about membership and some of the "wares" you've got. Could you also send membership information to a friend Derek Lassen? Take care and thanks for the NARA.

Joe Bajo, KC6BAL
Bajotronics
P.O. Box 577
Imperial Beach, CA 92032

□ Thanks for the kind words, Joe. You don't need to "jump ship." Ham radio needs an organization for both newcomers and old timers. The information you requested was sent. Thanks for the reference—Ed.

GEAR FOR NEW CLUB

We are very sorry to hear that the Uniden loaner radio program has been terminated. As a beginning club in the midst of budget cuts, it would have been a great help to us. Please keep us in mind if any other such programs begin. Meanwhile, we would appreciate any other materials you have available. The NARA magazine you mentioned would be of interest to us. Please send as many copies as possible. Thanks in advance

for this and any other help you might be able to extend to us.

Linda LaSala, N2KBW
82-34 267th St.
Floral Park, NY 11004

□ I'm sorry too, Linda, that no other manufacturers have stepped forward to run with the ball once Uniden was out of radios. What about you New York hams? What better place to send your excess gear that you can't unload on the swap nets? It's tax deductible and you'll feel better about yourself each morning when you look in the mirror!—Ed.

GOOD LUCK

Enclosed please find my check for \$20.00 for two new memberships in your organization. I've been around for a while as you have probably noted from my W1 call. I have seen a number of ham publications fall by the wayside, including a couple of my own. So when a "young ham" I had in my radio class back in 1935 recently sent me a copy of *The Amateur Radio Communicator*, my first thought was "gosh, someone has a lot of guts" to launch a ham magazine at this particular time. However, I've read it from cover-to-cover and must compliment you on an excellent start. Your multi-target is a wise one—hams to be and new hams. This type of publication is badly needed and has been for a long time. I hope you are successful in your undertaking. If you keep the content at a reasonably low level, I'm sure it will be a success. Good luck and I'll be watching!

J.A. Mullen, W1ASI

□ Joe, with financial and verbal support like yours, we cannot miss! We've ignored the newcomer for too long and NARA is making a significant contribution to correcting this situation. Keep watching and if you see us stray, let me know!—Ed.

CLASSES AND HAMFEST IN FLORIDA

The Space Coast Amateur Technical Group will start another Amateur Radio class on August 27 at 6:30 PM at Hoover Junior High School in Indialantic, Florida. The

(Continued on page 16)

All About Frequency

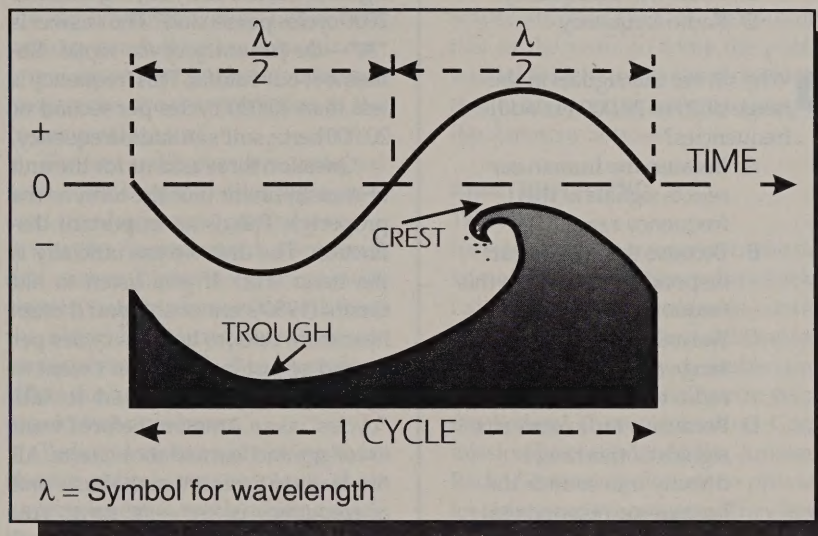
BY TERRY R. DETTMANN, WX7S

Frequency is a fundamental measure of any sort of alternating phenomena. But frequency is really very simple, it's just how often a repeating phenomenon repeats. For example, the sun rises once each day, so the frequency of the sun's rising is once per day.

Likewise, with a wave phenomenon, like radio waves, frequency measures how often something happens. Usually we talk about how many times a wave crest passes a given point. If I'm in my bathtub and drop my rubber ducky in the water, I'll get water waves moving away from where I dropped it. If I count the number of wave crests that pass some point (my toe, for example) in the tub per second, then that is the frequency. If 100 wave crests pass my toe per second, then the frequency is 100 crests per second. (You can guess how big my rubber ducky is with 100 wave crests per second!)

Each crest in a water wave represents the passing of a complete cycle from crest (the top of the wave) to trough (the bottom of the wave) and back to the crest. Measuring the number of crests per second passing a given point is the same as measuring the number of cycles passing that point. Thus, using my previous example, we would speak of 100 cycles per second passing our measuring point.

Radio waves act just like water waves, except that the waves are electromagnetic. To honor Heinrich Hertz, the scientist who first studied electromagnetic waves, we use the name



hertz to refer to cycles per second. So 100 cycles per second is 100 hertz (often abbreviated as Hz or Hz).

Audio frequencies, which run from 20 to 20,000 Hz, were named as such because human beings can hear sounds in that frequency range. When we receive radio waves signals at our antenna, we need to translate these signals into audio frequencies, then generate sound waves so that we can hear them. Our receiver does that for us. Radio frequencies, which are considered to be above 20,000 Hz or 20 kHz (kilohertz is abbreviated as kHz, which is another way of saying 1000 hertz) are what we hope to generate with our transmitters.

THE BASIC EIGHT

Now that you have learned some basic ideas and terms, let's test your new knowledge. The Novice examination selects from eight possible questions about frequency. Let's see what these questions are, and then we'll go through the answers.

- 1** What is the term for the number of complete cycles of an alternating waveform that occur in one second?
 - A Pulse repetition rate
 - B Hertz
 - C Frequency per wavelength
 - D Frequency
- 2** A certain AC signal makes 2000 complete cycles in one second. What property of the signal does this number describe?
 - A The frequency of the signal
 - B The pulse repetition rate of the signal
 - C The wavelength of the signal
 - D The hertz per second of the signal
- 3** What is the basic unit of frequency?
 - A The hertz
 - B The cycle
 - C The kilohertz
 - D The megahertz

4 What range of frequencies are usually called audio frequencies?

- A 0 to 20 Hz
- B 20 to 20,000 Hz
- C 200 to 200,000 Hz
- D 10,000 to 30,000 Hz

5 A signal at 725 Hz is in what frequency range?

- A Audio frequency
- B Intermediate frequency
- C Microwave frequency
- D Radio frequency

6 Why do we call signals in the range of 20 to 20,000 Hz audio frequencies?

- A Because the human ear rejects signals in this frequency range.
- B Because the human ear responds to sounds in this frequency range.
- C Because frequencies in this range are too low for a radio to detect.
- D Because a radio converts signals in this range directly into sounds the human ear responds to.

7 Signals above what frequency are usually called radio-frequency signals?

- A 20 Hz
- B 2000 Hz
- C 20,000 Hz
- D 1,000,000 Hz

8 A signal at 7125 kHz is in what frequency range?

- A Audio frequency
- B Radio frequency
- C Hyper-frequency
- D Super-high frequency

OK, did you get all the answers correct? You ought to be able to from our discussion earlier, but let's go over some of these things again.

LET'S GO OVER IT ONCE AGAIN

First, remember that frequency is the name for the number of complete cycles of a waveform as it passes a given point. While the first two questions ask about one second, techni-

cally we could measure frequency in cycles per fortnight (by the way, how long is a fortnight??). The important thing about the first question is that we want the term that designates the number of cycles per second. That term is frequency, so the answer is "D."

Question two is asking about the same thing, but in a different way. Again, what term or property of the signal is described by saying it makes 2000 cycles per second? The answer is "A"—*the frequency of the signal*. Remember our cutoffs. This frequency is less than 20,000 cycles per second or 20,000 hertz, so it's an audio frequency.

Question three asks us for the unit of measurement (not the term or the property). This is an important distinction. The unit we use officially is the hertz (Hz). If you listen to old timers (1950's era or so), you'll often hear them refer to hertz as cycles per second or just cycles. I don't want to date myself, but I learned to talk "cycles" as an Amateur before I went to college and learned about hertz. All this leads to the fact that the basic unit of frequency is "A"—*the hertz*. You should note the fact that all the answer choices to this question are units of frequency.

KILO, MEGA . . . ?

As I've noted, the term "cycle" is often used by old timers (although it's no longer really correct). However, kilohertz and megahertz are terms you'll hear frequently. Kilo means 1000, so a kilohertz is 1000 hertz. Mega means 1,000,000, so megahertz is a million hertz. These are both units of frequency, but the key is that they are not basic units.

Audio frequencies range from 20 to 20,000 hertz, so the answer to question four is "B"—*20 to 20,000 Hz*. This is the range of frequencies that the ear can hear, but the ear can hear them only as sound waves. Just because a frequency is in the audio range, doesn't mean we can hear it. For example, household current in the United States is 60 Hz. That is an audio frequency. But you don't hear the electricity hum in the lines in your house. (If you DO hear it, you have a problem with your

wiring.) To hear the frequency, it has to be converted to a sound wave by a speaker. Because of this, don't get confused when talking about audio frequencies.

AUDIO AND RADIO

So, from our discussion, just what type of frequency is 725 Hz? Do I have to tell you that it's "A"—*audio frequency*? No, you knew that already. The next question, number six, is also easy now. Only answer "B" fits the question. Audio frequencies are those that the human ear responds to. Remember, it responds only to sound waves in this range. But we still call the frequencies the audio range.

For the purpose of the Amateur Radio Novice examination, we don't worry about frequencies other than audio and radio. Anything *above* 20,000 Hz (or 20 kHz if you like), is radio frequency signals. Question seven's answer is "C." For question eight, when we get to a specific frequency, like 7125 kHz (remember, a kHz is 1000 Hz, so this is 7,125,000 Hz or 7.125 MHz), it's greater than 20,000 Hz (or 20 kHz), so it is "B"—*radio frequency signal*. As a novice, this is an important frequency for you—it's right in the middle of the novice 40-meter band. As a novice operator, you can operate at this frequency with Morse code.

WHEN YOU HAVE QUESTIONS

As we move slowly through the question banks over the coming months, there will be times that you may find you don't understand something we've referred to. While I'll try to explain what you need to know in any single article, it will be impossible to do that perfectly. If you have any questions you'd like to ask, feel free to write me at: NARA, 16541 Redmond Way, Suite 232, Redmond, WA 98052 or send a message to me via Compu-Serve at 72076,2611. I'll personally answer letters that come with a self-addressed, stamped envelope.

Terry, WX7S



A Short History of Amateur Radio Regulation

PART 2

BY FRED MAIA, W5YI

A common quality among Amateurs is an intense curiosity about electronics—especially communications technology. The ham radio hobby has evolved over the past hundred years, and continues to do so. Being an inquisitive lot, the hobby experimenter has always managed to keep a step ahead of the experts. Amateurs are constantly developing new and innovative ways to exchange information among themselves. Most of today's modern communication systems got their start on an Amateur's workbench.

While the cellular car phone may be an innovation to the public, hams have had access to the switched telephone network from their automobiles for more than a quarter of a century! Called a "phone patch," Amateurs have been radioing to other strategically placed "repeater" stations that are connected to phone lines. This provides local telephone calls from an Amateur's automobile at no cost! A touch-tone signal simply alerts the "repeater" to switch over to the telephone system. This is rudimentary cellular service.

MODERN EXPLORERS

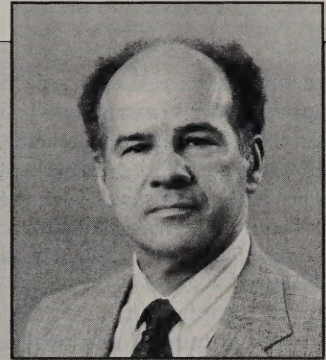
Not unlike the early pioneers who first reached out with their spark-gap signals, Amateurs are still exploring the frontiers of information exchange. Only the frequencies, technology, and equipment are different. Hams were first to discover the value of the short-waves. Once the properties of radio waves were more fully understood,

the "useless short-waves" became the primary conduit for long-range communications. The Amateur's allocated frequencies are worth billions to the commercial sector!

The first radio pioneers contacted each other by generating high-powered, low-frequency "ground waves." It was the Amateur who discovered that certain higher frequency radio signals could be returned to earth from the electrified mirror in the upper atmosphere called the *ionosphere*. When this happened, short-wave communication was born.

Today, Amateurs are using even shorter radio waves to pierce these ionized layers to reach orbiting satellites that transmit their signals back to earth. The big advantage of satellites is communication reliability! No longer do you have to count on the right atmospheric conditions. Even the maritime service, the initial user of short-wave HF for distress communications, is abandoning that spectrum in favor of satellite communications.

It was not too many years ago that most Amateur Radio transmitters and receivers had to be home built. There wasn't any of the push-button "appliance type" ham equipment now widely available in today's marketplace. Consequently, the licensing examinations had to be oriented toward proper equipment construction practices. I can remember having to draw schematic and block diagrams of various circuits. Instead of telegraph keys and microphones, the high-tech Amateurs of today operate computers, satellites, and radio "modems" to communicate digitally with one another. A modem changes digital voltages to audio signals. The Amateur's desire to reach out in novel



Fred Maia, W5YI

ways continues. There can be no doubt that in the years to come the public will be widely using the technology that is being experimented today in the Amateur Service.

AMATEUR RADIO TESTING

Investigating the mysteries of the unknown has its regulatory drawbacks. Laws are usually written to control known conditions. Ham radio operators enjoy many very desirable communications privileges. Over the years, the Federal Communications Commission has broadened the Amateur Radio Service regulations to provide for emerging technologies. They have also used many different schemes to test the knowledge of a person wishing to become an Amateur Radio Operator.

Until this year, the entry level into Amateur Radio was the Novice license. In the beginning, Novices were restricted to Morse code on three bands, 80, 40, 15 and phone on 2. Yes, Novices once had voice privileges on two meters, 145–147 MHz! This was before the appearance of VHF repeaters. Also, you had to be crystal-controlled (no sliding around the band) with a power limitation of 75 watts.

After an applicant passed the Novice 5 words-per-minute code portion, a volunteer examiner would write to the FCC for the Novice written examination that had to be mailed back for grading. Those who passed were sent a non-renewable Novice operator license good for only one year. There was a license fee for all license classes except the Novice.

Today there are two entry levels. The Novice examination is now completely administered by two General

Class (or higher level) Amateurs. No longer do the VE's have to send to the FCC for the written theory examination. The questions are selected from a bank of known questions. The question pool system was introduced in the early 1980's. This past year the FCC offered a second entry-level license. By simply eliminating the 5 words-per-minute Morse code requirement from the previous Technician license, the No-Code Technician Class license was created. This has proved to be very popular and more beginners are choosing the Codeless Technician Class as their initial Amateur license. It requires you to pass two written test elements on Amateur Radio regulations, operating procedures, and elementary electronics.

INCENTIVE LICENSING SYSTEM

There was a major change in the government's consideration of Amateur Radio in the mid-1960's. In 1967, the Incentive Licensing Program was established. To this day, this program remains controversial. The program rules reestablished the Advanced Class license that hadn't been available since 1951. The Novice license term was extended to two years, but they lost their 2-meter phone privileges. The FCC believed that Amateurs should be motivated to improve their Amateur operating and electronics knowledge by upgrading their license. To motivate approximately 100,000 General Class ticket holders, the FCC introduced choice, newly reserved phone and CW frequency blocks especially for Advanced and Extra Class licensees. This was to be the General Class licensee's incentive to upgrade. Some of those select frequencies, however, were already available to the existing General Class. This meant that the General Class Amateur had to pass another examination to retain them. Many Amateurs have never forgiven the FCC for establishing (or the ARRL for supporting) rules that required them to pass a harder examination to retain spectrum that they had already qualified for. Since then, neither the FCC (nor the ARRL) has ever proposed a loss of Amateur op-

erating privileges. Considering the flak they received, they are not likely to do so.

A NEW TESTING SYSTEM

It became apparent to many in the early 1980's that the FCC might be getting out of the Amateur Radio Testing business. The Commission had already abolished their Third Class Commercial Radiotelephone Permit and proposed to "... delete all Commission examinations for operators to install, service, maintain, and adjust transmitting equipment at AM, FM, and TV broadcast stations and abolish the radiotelephone first class operator license." The new rules would make broadcast station owners responsible for their radiated signals. The FCC also said that their "... commercial license tests do not account for experience and common sense, and they may even be susceptible to 'cramming' at the last minute ... It appears that the government may be able to remove itself from the testing function without any adverse impact." It stood to reason that if the FCC was going to remove themselves from testing professional radio operators, the Amateur Service probably would follow. (The FCC still examines certain commercial radio operators when required by international law.)

Also, the FCC was very annoyed with an Amateur by the name of Dick Bash, KL7IHP, from California. He made a career out of interviewing examinees to learn their Amateur test questions that he then published verbatim. He also received test questions in the mail from "feed-back" cards he inserted in his study manuals. A survey was done by the FCC's Field Operations Bureau to determine which study material provided the greatest number of successful examinations and the Bash material won overwhelmingly!

The FCC's General Council ruled that Dick Bash was doing nothing illegal "... since the questions were not stolen." Sensitive freedom of information, freedom of the press, and freedom of speech considerations also came into play. Similarly, the Federal

Aviation Administration openly published all of their written examination questions which Bash was well aware of since he was an airline pilot.

In early 1982, Senator Barry Goldwater, the nation's highest ranking ham operator, proposed the use of Amateur volunteers for preparing and administering all Amateur Radio examinations. Senator Goldwater said: "The availability of federal funds to administer the Amateur Radio Service need not and should not be permitted to preclude Amateur Radio involvement for the young or elderly."

It was the American Radio Relay League who submitted a detailed proposal to the FCC for implementation of a program of Amateur self-testing. The League suggested a certification program administered by a certified organization. The ARRL proposed that three examiners administer tests constructed from a pool of FCC-approved questions. It was concluded by everyone that the League wanted, and would be, appointed by the FCC as the sole administrator of Amateur Radio testing.

On September 14, 1982, President Ronald Reagan signed Public Law 97-259 into law. It authorized the use of volunteers to prepare and administer Amateur Radio operator examinations. The volunteers would be coordinated by a Volunteer Examiner Coordinator (VEC) who would act as the liaison between the government, who would issue the licenses, and the volunteer testing community. Amateur license terms were extended to a term of 10 years by this law.

Everyone waited for the ARRL to apply to become the sole Amateur testing administrator. A year later, the League still had not applied. The FCC, growing impatient, departed from their original proposal and decided to substitute regional coordinators for nationwide VEC's. They also announced that 1984 would be the last year of FCC Amateur testing—and even then, only four quarterly examinations would be conducted at their field sites. It appeared that Amateur Radio testing would be very difficult to come by in the future.

The ARRL apparently had second thoughts about becoming the sole administrator of Amateur testing. They said it would cost them millions of dollars, and that they needed a way to be reimbursed. Expense reimbursement was not part of the original legislation. Meanwhile, several other Amateur organizations, including The W5YI Group, applied to become a VEC. We were the first to apply to coordinate examinations in all Amateur Radio regions.

Last year we coordinated nearly 2,000 testing sessions throughout the world—over 34,000 examination elements. Nearly 20,000 applicants were administered ham radio exams at our test sessions. The W5YI-VEC has nearly 10,000 Advanced and Extra Class level volunteer examiners. The W5YI-VEC has grown to become a very large operation indeed!

Later, once provisions were made in the law for expense reimbursement, the American Radio Relay League applied to become a VEC. Today, there are eighteen different VEC organizations. However, the ARRL and W5YI groups are the larg-

est. Together, we account for about 80 percent of all Amateur testing.

In the next and concluding chapter on Amateur Radio regulations we will cover the early years of the VEC system, the status of Amateur Radio testing, and how you may easily become a licensed ham radio operator. Stay tuned.

INTERESTED IN BECOMING A HAM OPERATOR?

Today, becoming a ham radio operator is easier and faster than ever! You don't even need to learn the Morse code any more! Thousands of newcomers are joining the Amateur Radio ranks monthly! The only requirement is that you must correctly answer 41 out of 55 multiple-choice questions. The questions and correct answers are all known and widely published. Every VEC uses the same question pool. There are no surprises.

For more information call (toll free) 1-800-669-W5YI (9594). The W5YI Group has complete, low-cost study material available that will quickly

speed you on your way toward becoming a licensed Amateur Radio operator. Ask about our "No Code Education Package." We'll even tell you the location of the nearest testing session! Chances are it is right in your own city. See you next issue.

73, Fred, W5YI

Fred Maia, W5YI
National Volunteer Examiner Coordinator
P.O. Box 565101
Dallas, Texas 75356

ARE WE BIMONTHLY?

Not really, but it may seem that way. This is a combined issue with an August/September cover date and—surprise—you will receive it in the month of September. Even more astounding is the fact that issue five will not be a combined issue. It's dated October, but you will receive it early. From that point on, our publication should be monthly and on schedule. Do you suppose *QST Magazine* started this way? We doubt it ... they didn't have computers back in those days to help them out!!

HOW DID I GET THIS MAGAZINE?

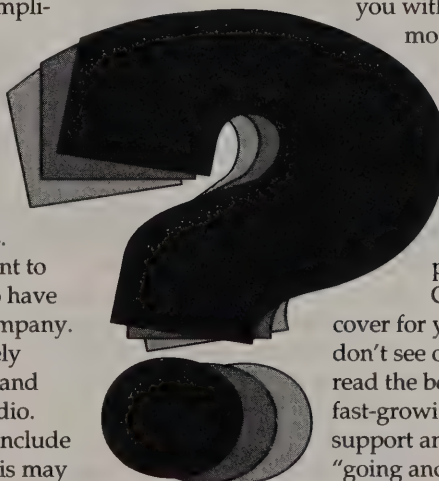
One of the ways we can tell the world about the goals and ambitions of the National Amateur Radio Association is to supply complimentary copies to non-Amateurs.

We send copies of each issue to hobby shops and science centers, and about 6,000 pieces to newly licensed hams. This magazine is also mailed to a select list of people who might be interested in becoming Amateurs. For example, this issue is being sent to approximately 20,000 people who have ordered products from Heath Company. In addition, we send approximately 10,000 copies to NARA members and prominent people in Amateur Radio.

If your mailing label does not include a NARA membership number, this may

be your last or only copy of *The Amateur Radio Communicator*. We would like to continue providing you with this informative publication each month, but we can only do so if you are a member. For those interested in becoming a ham, or who are newly licensed, a membership in NARA represents an outstanding bargain. A membership, which includes 12 issues of *The Amateur Radio Communicator*, is only \$10.00 per year.

Check the mailing label on the back cover for your membership number. If you don't see one, look up about six inches and read the benefits of becoming a member of this fast-growing organization. We need your support and so does ham radio. Help us get it "going and growing!"





Dan & Burke

Gold is where you find it

The crisp autumn air puts new life into a young fellow; Dan vaulted nimbly over the low fence that separated his yard from that of his chum, Burke Olan. But he stopped short as he caught sight of his friend out on the lawn near the street. On Burke's head was a pair of huge muff-type headphones that were plugged into a small aluminum box slung from his shoulder. From this box, a cord led to the strange device he held in his hands. The device consisted of a long broom handle attached to a crosspiece on a large, flat, wooden hoop. The broom handle was angled in order to hold the hoop parallel to the ground. Burke's round face wore a faraway look of abstract concentration as he shuffled along, waving the hoop back and forth over the sprouting grass.

"Hey, Ber, whatcha doin'?" Dan demanded when he managed to catch Burke's eye.

"What did you say?" Burke asked, sliding the phones forward on his head so that he could hear.

"I asked what you thought you were doing with that contraption."

"You mean my worm-warmer here?" Burke asked, with bland

innocence. "I'm just doing my bit for be-kind-to-worms week. This is a radio frequency induction coil that heats the ground beneath it and makes things comfy for the poor little worms that are chilled and shivering from the frost."

"Ask an intelligent question and you get a smart-aleck answer," Dan muttered. "Are you going to tell me what that is, or am I going to have to squeeze that narrow hoop down over your fat, flabby body?"

"All right—don't go ballistic. This is a metal locator. I built it from stuff I saw advertised in *Nuts 'N' Volts Magazine*."

"How does it work?"

"Inside this aluminum box is an oscillator operating on about two megahertz. Shielded from this circuit is another oscillator. However, the inductor part of the second tuned circuit is wound around this wooden hoop. Shielded wire connects the outboard inductor, or coil, to the rest of the oscillator circuit inside the box. The two oscillators are tuned to very nearly the same frequency.

"I'm with you so far," Dan responded.

"Okay, you know how you hear a whistle on your radio? When two stations interfere with each other,

these are called *heterodynes* or *beat notes*. The frequency of the whistle depends on how close the frequency of each station is to the other. If they were both on the same frequency, there would be no difference and you wouldn't hear a whistle. This is called *zero beat*.

"I tune the two oscillators in the metal locator very close together so that a low audio difference-frequency beat note is produced just like the example of the radio stations. The beat note is detected, amplified, and fed to the earphones. Are we still in sync, my curious friend?"

Dan nodded and scowled simultaneously, not knowing whether he had been chided or not.

Burke continued. "Do you remember the question in the Amateur Radio Technician test that asks what happens when various types of metal are inserted in a coil?"

"Of course I remember, I passed the test, didn't I?" Dan boasted.

"Well, when a metallic object appears in the field of the large coil wound on the hoop, its presence affects this field and causes a slight change in the oscillator frequency. This, in turn, changes the beat note frequency since the frequency relationship between the two oscilla-

Dan & Burke

tors has changed. This varies the beat note frequency heard in the phones and tells the operator that the probe coil is near some metallic object.

"Here," Burke said, as he freed an earphone from the headband; You walk along behind me and listen, and I'll show you what I mean."

When Dan held the earphone to his ear, he heard a low-pitched musical tone. Suddenly, as Burke moved the hoop over the grass, the note rose to a high pitch, then it went back down as Burke kept walking. Probing the area with the coil established that there was a narrow path perpendicular to the curb that caused the high-pitched sound. But if the coil was moved to either side of this path, the note in the phones returned to the normal low sound.

"What's down there?" Dan asked.

In answer, Burke followed the invisible object beneath the surface with the metal locator right to the curb, where a large "G" was chiseled in the cement.

"It's the gas line," he explained.

"The gas people marked the curb this way when the cement was laid so that they could find their service lines easily."

"What else is the gadget good for?"

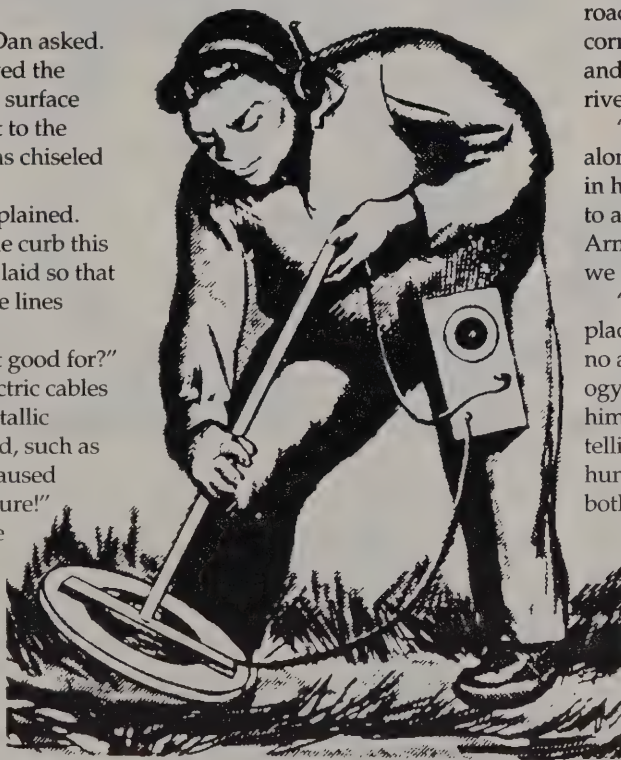
"Locating pipes and electric cables in walls, or finding any metallic objects buried in the ground, such as pipes, tanks, or—" Burke paused dramatically, "buried treasure!"

Dan's eyes opened wide behind his horn-rimmed glasses. "You're holding out on me!" He accused. "Give!"

Burke leaned on the handle of the metal locator as he talked: "Saturday, a week ago, Mr. Gruber and I went up Eel River to the mouth of Tick Creek fishing. The fish weren't biting, and we did a lot of talking. For once I managed to get him off his favorite subjects of flying saucers and space travel, and he told me an old legend he had heard from his father.

"Many years ago, a party of soldiers passed down what is now

Dixon Highway. They were part of a wagon train delivering supplies, a couple of cannons, and gold bullion to a new settlement in the Pacific Northwest. They camped on the banks of the Eel River so that they could replenish their water supply. The government party was attacked by either a band of Indians who were afraid that the soldiers were there to harm them, or a bunch of "highway-men" that wanted to rob them. The story goes that before the government party was wiped out, they buried the



gold somewhere on the banks of the Eel River. Not a single member of the party survived; consequently, it's still there waiting for someone to find it.

"According to Mr. Gruber, when he was a boy, he and his friends used to hunt for the gold the whole length of the river. Later, when he was grown, the legend became a some-

what of a hobby with him, and he read every scrap about it he could find. Out of his studies came the conviction that the assembly encampment must have been very near the mouth of Tick Creek, and that the gold is buried in that vicinity. Of course, this still leaves a lot of territory to be explored by tedious digging, but with a gadget like this, a person could go over a lot of ground in a hurry—"

"Well, what are we waiting for?" Dan demanded. "I'll get a couple of shovels and a pick, a tow sack to bring back the loot, and you get your bike. Yo-ho-ho, and a bottle of rum!"

Tick Creek emptied into Eel River only a short distance above the town. Within the hour, the boys had hidden their bicycles in the bushes along the road and began trudging across the cornfield that lay between the road and the thick line of trees marking the river bank.

"Hey, Bur," Dan said, as he strode along with the digging tools cradled in his arms, "do you think we ought to ask permission from ol' Noble Armond, who owns this farm, before we start looking for the gold?"

"Naw," Burke replied. "In the first place, he's an old crab and would say no automatically. This new technology stuff would scare the pants off him. Secondly, I'd feel kind of silly telling him we wanted to go treasure hunting on his farm. He'd think we'd both blown our corks for sure. Of course, if we find anything, we'll tell him and divide it up with him."

By the time this serious matter was settled, the boys had reached the point where the shallow Tick Creek flowed into the Eel River, thrusting a flat sandbar halfway across the larger stream. Burke quickly unlimbered his metal locator and began a systematic survey of the area, while Dan tagged along at his heels, breathing down the back of his neck. The boys had been prospecting for scarcely 10 minutes when Burke stopped dead in his tracks so abruptly that Dan stumbled into him.

Dan & Burke

"What is it? What do you hear?" Dan shouted anxiously.

"There's something down there," Burke said slowly, as he moved the probing hoop around in an exploring circle. "It's right here, and it seems as big around as a small washtub."

As Burke finished speaking, Dan thrust him aside and began digging feverishly at the spot where the metal locator had given the strongest indication. Even Burke, who ordinarily had a strong aversion to any kind of physical exercise, grabbed up the other shovel and began turning over the soft earth. The boys quickly dug a hole about three feet in diameter, and when it had reached such a depth that the edge of the hole came to Dan's chest, his shovel suddenly gave forth with the hair-raising sound of metal scraping on metal.

"Easy now," Burke admonished, as he knelt at the side of the hole and peered intently down to what Dan was gently scraping the dirt from with the edge of the shovel.

"Aw heck!" Dan suddenly said, with deep disappointment. "It's just a roll of old fence wire."

"And what did you expect?" A gruff voice asked from behind him.

The heads of both boys jerked up to see a scowling farmer carrying a pitchfork, towering over them.

"What do you young rascals think you're doing?" He demanded. "Now climb right out of that hole and start filling it up. Do you think I want one of my cows stepping in that and breaking her leg, making it necessary for me to destroy her? What are you trying to do, anyway?"

As the boys meekly started shoveling the earth back into the hole, they told him about the legend and tried to explain the operation of their metal locator.

"A likely cock-and-bull story!" Mr. Armond sneered. "I've never held with these scientific gadgets since I gave a fellow with a peach tree fork 10 dollars to twitch a well site for me. We dug straight down 140 feet right where he said and never struck a drop of good water. You just gather up your junk, and I'll personally escort



you off my property. And if you know what's good for you, you'll never set foot on it again."

Burke rigged himself up with his metal locator and Dan gathered up the tools. All three started across the cornfield toward the road, with ol' man Armond, his pitchfork cradled in the crook of his arm, following Burke. When they were about halfway across the field, Burke stopped so abruptly that Mr. Armond narrowly averted thrusting the tines of the pitchfork into the boy's leg.

"What are you trying to do!... Make me hurt you so you can sue me?" Mr. Armond bellowed. "Keep moving!"

"Wait a minute," Burke said, as he moved the search coil about over the

broken cornstalks. "I'm getting an indication of something down here."

He set the probe down, dropped to his knees, and began to scrape away at the soft earth where he had obtained the strong reading. In a moment he stood up, dangling something from a dirt-encrusted chain that glinted yellow in the bright sunlight.

"Here, let me see that," Mr. Armond said sharply. He brushed aside more of the clinging dirt and then exclaimed, "Well I'll be danged if it's not my pappy's old watch that I

lost when I was checking corn last spring. I thought I'd never set eyes on it again and that grieved me sorely, for I put a great store in that old turnip. The case is heavy gold, and it was given to my father by my mother on their wedding day. See, here's an inscription on the inside. I wouldn't trade it for the finest diamond-studded watch you could buy."

He paused a moment and then went on: "I'm mighty obliged to you boys for finding

it for me, and here's five dollars for each of you. Take it, I wouldn't have it any other way. What's more, I'm downright ashamed of acting so crabby with you before."

"Aw, that's all right Mr. Armond," Burke said. "We really should have asked your permission before we trespassed on your property anyway. What tickles me, is that we were able to prove to you that this gadget, unlike that fellow's peach tree fork, really does what it's supposed to do."

"Well, you certainly convinced me," Mr. Armond said heartily, with a broad and friendly grin. "And I'll tell you what! I have to take a load of steers to the livestock auction today, but if you fellers can come back

(Continued on page 16)

Ham Radio + Earth Science = Opportunity

BY RICHARD J. REED, N9AKZ

Iwould like to relate my use of the HR-2510 transceiver from Uniden and the National Amateur Radio Association by describing some personal experiences in our program.

In the evening I teach high school science for the Community Education Program at Hartland Consolidated Schools. As with most Community Education programs, many of our students are returning to finish high school after unsuccessful educational experiences.

Basically, our course has been an Earth Science class. As a ham and private pilot, I introduced electronics, communications, and navigation into the class to try to make it more interesting and relevant to today's technologies. This past fall, I began teaching Amateur Radio as a focus of activity rather than as a sidelight. In addition to receiving the Uniden 10-meter radio through the NARA, we received a \$750 Teacher's Mini-Grant from the State of Michigan to purchase a two-meter transceiver, power supply to run both radios, an antenna tuner for the 10-meter radio, and a table to hold the equipment. The school has provided the antennas and feedlines.

There might be a misconception that Amateur Radio and aviation, or even science in general, are areas involving only advanced, bright students. My challenge has been to stimulate interest and involvement in science among students whom some might label as "losers." I certainly have a long way to go to show that teaching Amateur Radio has the same value as traditional science classes, but so far, the results are encouraging. I would like to relate some experiences that might serve as stimulus for those who are trying to teach science through Amateur Radio.

First, I would like to tell you about a student named Russ. I don't know all of Russ's story except that he dropped out of high school several years ago. He returned

to school last fall at the age 25 or 26 to earn his diploma. We began the school year with a segment on astronomy, and then meteorology. We also spent a lot of time on Amateur Radio, using a combination of Carole Perry's program and *Tune In the World* from the American Radio Relay League. During school hours we have listened to the AMSAT network in Detroit on the 145.33 MHz repeater, tried out packet radio, tuned antennas for class members' CB radios, talked on two-meters, listened to one class member's general-coverage receiver, and talked with hams from Puerto Rico to California. One night in March, Russ told us he had just passed an employment test for the Detroit Diesel Corporation and would soon be entering their training program. This was obviously a big opportunity for him. He also held up a copy of *Air and Space Smithsonian* and asked if I had ever heard of it. I told him that I subscribed to it. He shook his head and said: "I should have known. I have to tell you Mr. Reed, you got to me with this science stuff. I have also subscribed to *Science* magazine."

Obviously, Russ's comments were a big boost to my ego. But it is also a big boost to the relatively new concept that Amateur Radio can play a positive role in science education, as well as in other areas of education.

My students got in the habit of using the atlas to look up the locations of the Amateur stations we had heard on the radio. This was a great experience for everyone. On one particular evening they told me that they had learned more geography that night than they had in all their previous years in school.

My feeling is that the combination of radio, aviation, and space captures the spirit and imagination of both young and old. My goal is to bring as much of space and communications technology into the classroom as possible. I hope to become more involved in Amateur satellite activity and the SAREX programs. I hope that students of low ability or poor performance are able to participate in some of the new programs being developed. In fact, Amateur Radio may do more for these students than for brighter, more successful students.

I would like to express my appreciation and that of my students for the HR-2510. We are looking forward to using the radio again next year. □

Contact the author by writing: Richard J. Reed, N9AKZ, Hartland Community Education, P.O. Box 900, Hartland, MI 48353



The four members of Richard Reed's Physical Science adult education class are Linda Wilkinson, Russ Rumohr, Jim Hoskins and Rob Leech. The class was

one of the recipients of the Uniden 10-meter radio for schools. Rob Leech also contributed a general coverage receiver.

Amateur Radio Classes at Hotels

BY GORDON WEST, WB6NOA

Instructors and "Helping Hams" are finding it harder and harder to locate a quality classroom to conduct weekly, or all-day weekend, ham radio classes. The usual meeting rooms at schools, banks, and recreational centers now require enormous deposits, outrageous fees, and a now a new twist—a self-insured policy showing that they are not liable in case of any accident on the premises.

While the school districts, banks, and community centers are making their room rentals difficult and expensive, local hotels are making it easier! In fact, your next ham radio classroom may be just around the corner at your local hotel or motel. Most motels and hotels offer conference rooms for any type of organization or individual. This fits perfectly for the "Helping Ham" who wants a small room to teach a ham radio class of, let's say, 25 students.

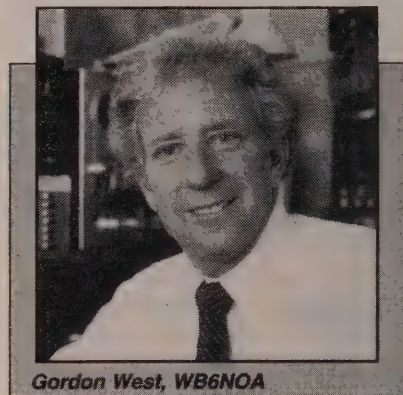
The rooms could be available on a weekly basis on one evening, or booked ahead of time for a three-day weekend event. Here at Radio School, we book hotel conference rooms at least a year in advance to insure they don't sell out ahead of time!

The conference room must be well-lighted, have access to an outside-mounted vertical antenna, and have access for the handicapped. The conference room should also have tables and chairs to accommodate the number of students you plan to instruct.

Use draped, six- or eight-foot conference tables, but request the wide tables. Some hotels will put in long, narrow tables. The narrow tables seldom give your students enough room to spread

out their materials and send code with their keyers. The regular-sized 6- or 8-foot table is fine—three people at a 6-footer, and four people at an 8-foot table. In a very small room, you can almost double the number of attendees at an 8-foot table by putting the tables perpendicular to the instructor. Three students sit at one side of the table, and two students sit at the other. This arrangement requires the students to turn their heads slightly to see the instructor at the front of the room. You can even angle their chairs so that they don't have to strain themselves in this type of "tight-seating" classroom configuration. Also, conference rooms should have a chalkboard or dry-erase white board. It needs to be large enough so everyone in the back of the room can easily see what you are writing on the board.

At the front of the conference room is your live-equipment set-up. (See the



Gordon West, WB6NOA

June/July issue of *The Amateur Radio Communicator*.) If the room is wide enough, I can use at least 18 feet of table space for my set-up! Two 8-foot tables are fine. Allow yourself enough room in back of the tables so that you aren't tripping over wires as you try to get to the blackboard.

The equipment table should be arranged so that there is absolutely no chance of any student tripping over any wires leading to the outside antennas. Remember, safety and your liability are always of primary importance when setting up live ham radio equipment.

Also, be sure to check the air-conditioning. If you are in a small room, do you share an air-conditioning system with someone else in a bigger room? If you do, this could freeze you out in no time! Make sure that your air-conditioning and lighting are independent of other rooms.

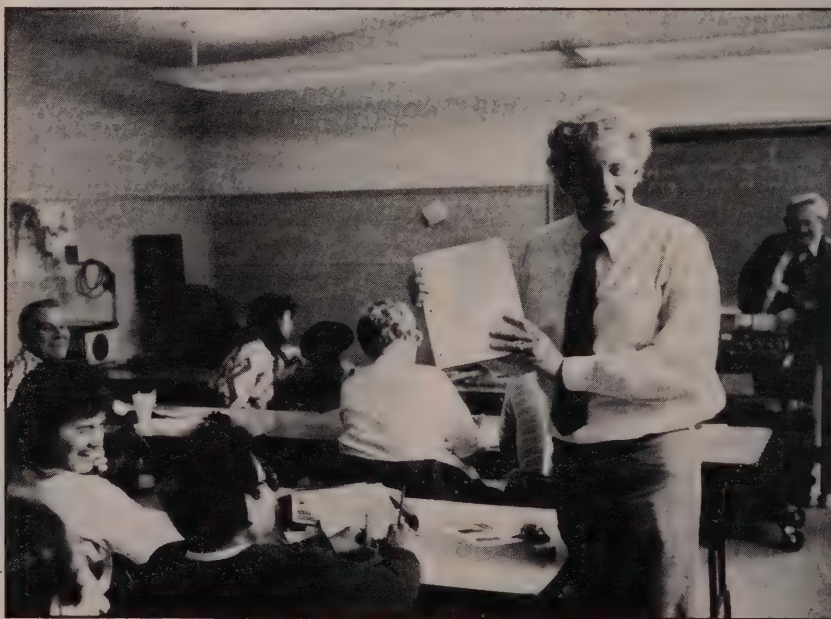


Photo by Dan Fort, AA6LM

The hotel tables must be wide ones for the students to spread out.

TEACHING THE HAM CLASS

Some conference rooms have piped in music. Make sure that you can shut the music off before you begin your seminars. If you're teaching over 50 students, you may wish to rent a PA system and lapel microphone. You will need your hands free to send the code and draw on the board.

The hotel may charge you a flat, room rental fee, or base the room expense on a minimum number of meals to be served on a Saturday or Sunday all-day class. The hotel will probably provide ice water service. Many times you can get a hotel conference room for an extremely low price if you have the hotel serve the meals. But be prepared for a served lunch to cost from \$10 to \$12 per student if the room is given to you free of charge. Also be prepared for the possibility of a 15 percent surcharge on the bill to cover the services of the hotel personnel.

Now you need to do your homework. A calculator will be handy: Is it better to rent a room for a flat rate of \$150 a day, or to bring in 10 students and have them served a meal at \$12 each, plus gratuities? Is it worth it for the students to eat right there in the classroom, or to drive off premises and try to locate their own quick food service that can be ac-

complished during the 45-minute lunch break? Will your students accept a \$15 per person bill for lunch service? And if you rent the room without meals, will you get hourly ice water service? These are important considerations when figuring out whether to rent the room by the day, or set up meal service and get the room free. Your contact is the hotel catering department. The sales and catering personnel are usually eager to accommodate your classroom needs. Speak with them frankly about whether or not you should rent the room at a flat rate, or bring in a food and beverage service.

If you're holding very large classes, it might be preferable to work with the hotel and set up meal service and charge the students accordingly. This is a very professional way to go; the students will surely be impressed with your class because they are taken care of regularly during the entire session. There is always fresh water, a change of linen in case of a spill, regular coffee service, and a great sit-down lunch served by professionals. This is a nice touch to your seminar.

Most hotels don't require you to submit self-insurance policies or business licenses. I suggest that you get some professional teaching insurance, and I strongly urge you to comply with all local, state, and federal licensing laws. Did you know that there is a requirement in many states that anyone who presents a seminar and charges ahead of time for classes, post a bond with

that particular state in case they go out of business? Did you know that some hotels won't allow you to rent a room without insurance policies for instruction as a vocational school? Did you know that many cities won't allow you to conduct paid-for classes unless you have a city business license?

If you stick to the letter of the law, you won't get in trouble in the middle of a Saturday afternoon class. These considerations cost money. For this reason you may wish to reevaluate your per-student class fee. If you are teaching class just for the love of it, we would hope that your students would help defray the cost of being a professional Amateur Radio "Helping Ham."

The next time your business travels lead you to a big hotel, look in on the conference rooms—are they all in use? If they aren't, that hotel is looking for your business. The men and women that I work with throughout the country at large and small hotels are usually quite eager to get that room rented at anytime. Take a few minutes and see what is necessary to rent a room. What are the deposit requirements? How much do the individual meals cost?

I find dealing with hotels much easier than trying to wrangle a room out of a city, church, or bank. Trying to get something for nothing when it comes to a classroom is usually counterproductive. Going to a hotel and working with their sales and catering staff usually leads to a room that will be just right for your next Amateur Radio class.

73, Gordon, WB6NOA

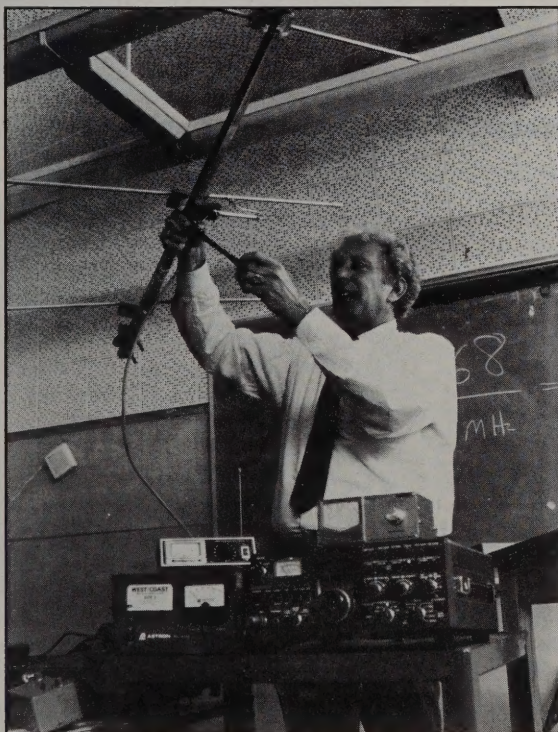


Photo by Dan Fort, AA6LM

Good lighting is a must so everyone can see what you are doing.

CQ ALL SCHOOLS ON THE AIR

Every Tuesday and Thursday morning, at approximately 1800 hours UTC, Carole Perry, WB2MGP, and Gordon West, WB6NOA, go on the air with the 10-meter CQ ALL SCHOOLS net at 28.303 MHz. If you are teaching a day class, or teaching in the school systems be sure to tune in. Join Carole and Gordo for a lively classroom-to-classroom contact. Prepare to QSY up the band as soon as you make contact with another classroom on the air.

ON THE COVER

(Continued from page 1)

copies of ham publications. The cover represents everything that NARA stands for—using a thousand words, we could not have said it better. Congratulations to photographer Jim Hilt and thanks to the Dayton Amateur Radio Association for permission to use this photo on the cover of *The Amateur Radio Communicator*. □

THE ADVENTURES OF DAN AND BURKE

(Continued from page 12)

tomorrow afternoon, I'll get my shovel and go along with you. We'll comb this old farm of mine with that gold-sniffing gadget of yours to a fare-thee-well . . . that is, if you don't mind letting a crabby ol' cuss like me in on the fun."

The boys looked at each other and chorused together, "Glad to have you join us, Mr. Armond!" □

DAN AND BURKE is based on a storyline created in 1954 by John Frye, W9EGV. The boys are the sons of John's original characters, Carl and Jerry.

John Frye is no longer with us. But while he was alive, John was an avid Amateur Radio operator who wrote about young people—for young people.

It's doubtful that anyone could make John's stories more interesting or improve on his words. We'll settle for giving them a 1990's twist.

If you would like to learn more about becoming an Amateur, write to the National Amateur Radio Association, 16541 Redmond Way, Suite 232, Redmond, WA 98052 or call 1-800-GOT-2-HAM (1-800-468-2426).

BOOK REVIEW

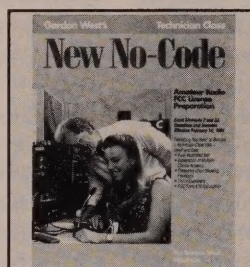
Gordon West, who writes our column, "Teaching the Ham Class" has just completed a new license preparation manual. It is 232 pages in length and includes all the questions contained in Element 2 and 3A. Gordon's approach is to provide the correct answer and an explanation immediately following each question and the four possible multiple choice answers.

MAKING IT EASY

Gordon West comments that "Seeing the right and wrong answers right after the official questions is a quick and easy way to learn the material. You don't have to flip back and forth between the back of the book and somewhere in the middle to find out how you are doing. You just read the question, look for the correct answer, then confirm your correct choice. You then read his description on how this question and the

correct answer deals with the real world of ham radio.

The Technician Class New No-Code book is more than the official questions with the correct answers. Gordon has included information and charts describing the Amateur Radio Service and the privileges allowed for this new license class. As a well known radio school instructor, Gordon tells the student how to study and prepare for the examination. how to and where to take the examination and how to fill out the FCC form 610, the Application For Amateur Radio Station/Operator License, which is bound in the back of



New No-Code License Preparation Manual
Gordon West, WB6NOA

the book.

You can find Gordon West's book in leading Amateur Radio dealer stores or the local Radio Shack for \$9.95. He's done a fine job in providing the necessary information in a well organized and readable form.

LETTERS

(Continued from page 4)

class is part of the Brevard Community College's Adult Education program. The class fee is \$25 and will run 12 weeks. It takes people through the Technician Plus. Note also that the Melbourne Hamfest is September 13-15 at the Melbourne Auditorium. For information, write Hamfest, P.O. Box 1004, Melbourne, FL 32901. Please send a self-addressed, stamped envelope.

Bill Kewkirk, WB9IVR

□ Good luck, Bill. It pleases us to see clubs taking an active position in training as well as testing future hams!—Ed.

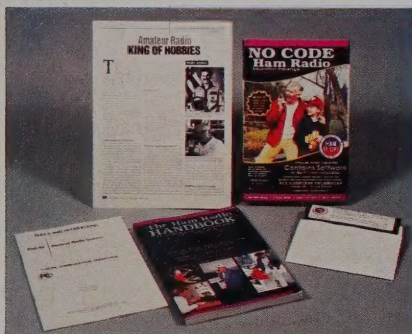
OUR FIRST MISTAKE OF THE YEAR

In a recent Gordon West column, he mentioned that clubs should take their notices to the local Radio Shack ONLY after writing me for permission. Wrong! Our stores are authorized to let Amateur clubs post notices of meetings, testing schedules and classes without further permission. If there is any problem, have the store personnel call me and I will confirm it's okeh.

Thanks,
Ed Juge, W5TOO
Tandy Corporation
Public Service

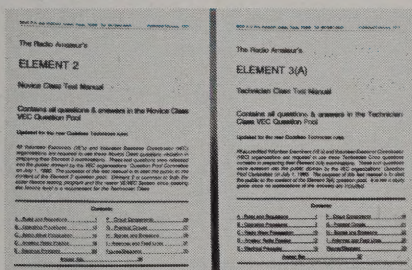
The Editor would like to hear from you! Send your questions or comments for the Editor to: National Amateur Radio Association, 16541 Redmond Way, Suite 232, Redmond, WA 98052 or via MCI Mail (NARANET3) and CompuServe (76702,753)

AVAILABLE FROM NARA



Pass The New Codeless Technician Test!

The NARA Educational Package from the National Amateur Radio Association includes: *The Ham Radio Handbook*; 5.25" IBM compatible software for testing your knowledge; a complete list of Contact Volunteer Examiners; the FCC Rules and Regulations for Ham Radio and Amateur Radio—King of Hobbies, a publication explaining what Amateur Radio is all about. The NARA Educational Package is just \$29.95 (\$3.00 S&H).



The FCC Question Pools

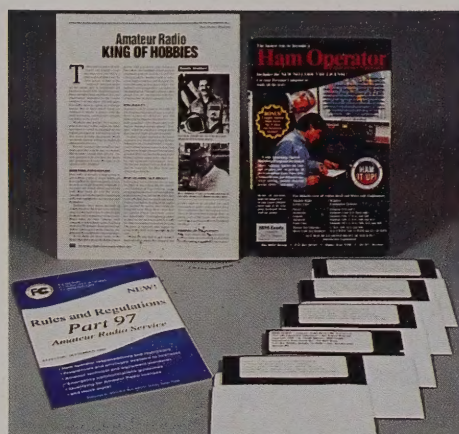
Each booklet contains all the questions and answers for each license class. Does not contain any explanations. Order by license class \$3.00 each (\$1.00 S&H) or order the Novice and Technician together (all the questions for the new code-free Technician class license) for \$4.95 (\$1.50 S&H).

The Ham Radio Handbook

The leading book for anyone wishing to earn the new code-free Technician license. Includes every question you might be asked during a test session, plus the four multiple choice answers. *The Ham Radio Handbook* is the only test manual that explains in detail why the correct answer is correct. Includes simple and easy-to-understand theory along with many photos and drawings. The book divides the test questions by subelement, devoting a chapter to each. The appropriate test questions and answers are given at the end of each chapter. The list of correct answers is included at the end of the book. Guaranteed to provide all the information needed to get your ham radio license. *The Ham Radio Handbook* is only \$9.95 (\$2.00 S&H).

The Rules of the Road

It took the Federal Communications Commission nearly two years to completely overhaul the Amateur Radio Service Rules to reflect current technology and Amateur operations. The FCC also deleted many unnecessary, obsolete, and redundant rule provisions.

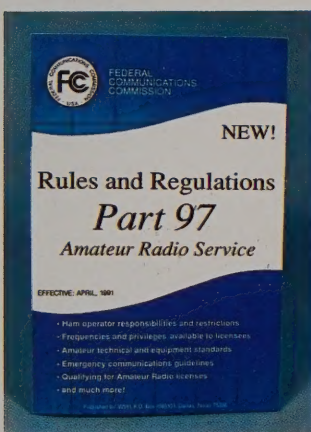


Taking a Ham Radio Test?

This amazing collection includes self-testing programs for every license class. Study all 1,931 questions by license class and supplement. The software covers the Novice, Technician, General, Advanced, and Amateur Extra on four separate disks. Each disk includes every possible test question and four multiple-choice answers for each one. You can take sample ham tests right at your IBM compatible keyboard by selecting the correct answer or print out tests just like you will be given during a testing session. Prompts you if the answer is incorrect and tabulates your score both in numbers and percentage correct. This is the definitive work for anyone wanting to go "all the way." The *Ham Operator Package* also includes a copy of Part 97 of the Rules and Regulations, and a copy of *Amateur Radio—King of Hobbies*. The *Ham Operator Package* is only \$29.95 (\$3.00 S&H).

Having Trouble with Code?

The *Morse Academy* software actually teaches all 43 required code characters and then steps you up through the Amateur Extra 20-wpm level using sophisticated computer aided instruction techniques. Adjustable tone, standard or Farnsworth spacing. Sends text or random generated characters—even properly constructed code exams. Many features—plus a 40-page on-disk manual! \$14.95 (\$1.50 S&H).



For the fastest service, call NARA at 1-800-GOT-2-HAM (1-800-468-2426)

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- VE's (volunteer license examiners) who administer the Amateur Radio exams
- Amateurs concerned about the future of the Amateur Radio Service

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- 1 You'll get the latest facts on what's happening in Amateur Radio
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- 3 You'll be helping to insure a solid future for the Amateur Radio Service

This means an exciting future for you as an Amateur Radio operator!

Here's What You'll Find in the Communicator!

Each month, the *Communicator* will include clear and informative articles on topics such as:

- Passing the Amateur Technician Class exam
- Erecting your first antenna
- Different types of Amateur communications
- Getting materials for your radio classes
- Classroom demonstration techniques
- Obtaining commercial support for your classes
- Keeping your students motivated
- Publicizing your Amateur Radio class
- The latest details on rules and regulations
- Up-to-date information on the VE program
- The latest news on proposed changes to the Amateur Radio Service
- Repercussions that regulation changes will have on the future of Amateur Radio

NARA publishes the only non-commercial ham magazine that addresses these subjects in a simple-to-understand manner.

What's NARA Doing?

The goals of NARA are to:

- Get more people licensed in the Amateur Service.
- Save the various Amateur bands (frequency ranges) from confiscation by commercial interests.

▶ In the past year, Amateur Radio has lost part of the 220-MHz band and, in some areas of the country, is in the process of *losing access* to another band (900 MHz).

NARA is striving to get more people involved in the Amateur Service so we can increase activity and retain our remaining Amateur bands.

When you join NARA, your membership dollars will be used to **further these goals**. Let's face it—with a subscription cost of only \$10.00 per year, **you won't find a better value in Amateur Radio!!** Join today! It's easy. Just complete the subscription form below and mail your check or money order. For the fastest service, call 1-800-GOT-2-HAM (1-800-468-2426) with your Visa or MasterCard number.

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